CLAIMS:

1. A differential detector comprising:

a frequency converter arranged to convert an input signal into a demodulated baseband signal;

sampling means arranged to sample said demodulated baseband signal at a sampling frequency to provide a sampled signal;

a demodulator arranged to demodulate the sampled signal to provide a demodulated signal; and

frequency offset sensing means arranged to sense an envelope of the demodulated signal to provide an offset signal indicative of a frequency offset of the input signal.

2. A differential detector according to claim 1, wherein said sensing means comprises:

means arranged to track the envelope of said demodulated signal from said demodulator and provide a tracking signal; and

a filter arranged to low pass filter the tracking signal to provide the offset signal.

3. A differential detector according to claim 2, wherein said filter is an adaptive IIR filter.

4. A differential detector according to claim 2, wherein said sensing means further comprises a filter coefficient generator

5. A differential detector according to claim 4, wherein said filter coefficient generator reduces the filter coefficient as a function of time.

6. A differential detector according to claim 5, wherein said filter coefficient generator adjusts the coefficient of filter according to the following:

$$\alpha_n = \frac{31}{32}\alpha_{n-1} + \frac{1}{32} * \frac{1}{256},$$

wherein α_n is the filter coefficient at time n, α_{n-1} is the filter coefficient at time n-1.

7. A differential detector as claimed in claim 2 wherein said filter has a bandwidth which decreases as a function of time.

8. A differential detector according to claim 1 wherein said sensing means further comprises a reset signal generator arranged to detect the start of input data transmission and reset the sensing means.

9. A differential detector as claimed in claim 8 wherein the generator is arranged to detect signal power to detect the start of transmission.

10. A differential detector as claimed in claim 9 wherein the demodulator comprises power normalizing means arranged to generate a power signal from the sampled signal and provide a normalized demodulated signal to the generator.

11. A differential detector as claimed in claim 1 wherein the demodulator includes power normalizing means arranged to generate a power signal from the sampled signal and provide a normalized demodulated signal to the sensing means.

12. A differential detector according to claim 1, wherein the sensing means further comprises a comparator arranged to compare said demodulated signal with a threshold provided by the offset signal to provide an output signal.

13. A differential detector according to claim 12, wherein said comparator provides a logical "1" output if said demodulated signal is larger than the threshold and otherwise output logical "0".

14. Apparatus as claimed in claim 1, wherein the sensing means is arranged to sense the envelope of the demodulated signal by making the following determinations:

if $x_n < x_{n-1} > x_{n-2}$ and $x_{n-1} > Min + threshold$ and $x_{n-1} < MAX$,

And if $x_{n-1} > Max$ or $x_{n-1} > dc_{n-1}$, then $Max = x_{n-1}$

if $x_n > x_{n-1} < x_{n-2}$ and $x_{n-1} < Max - threshold$ and $x_{n-1} > -MAX$,

And if $x_{n-1} < Min$ or $x_{n-1} < dc_{n-1}$, then $Min = x_{n-1}$

where, x_n, x_{n-1}, x_{n-2} are respectively a sample at time n, a sample at time n-1 and a sample at time n-2 of said first input signal, dc_{n-1} is a low frequency component of the envelope of the demodulated signal at time n-1, Max and Min represent values of negative and positive peaks of the envelope of the demodulated signal, and threshold and MAX are preset constants.

15. Apparatus as claimed in claim 14 , wherein the threshold and MAX are proportional to a sampling duration, a modulation index or amplitude of the demodulated signal.

16. Apparatus as claimed in claim 2, wherein the sensing means is arranged to sense the envelope of the demodulated signal by making the following determinations:

if $x_n < x_{n-1} > x_{n-2}$ and $x_{n-1} > Min + threshold$ and $x_{n-1} < MAX$,

And if $x_{n-1} > Max$ or $x_{n-1} > dc_{n-1}$, then $Max = x_{n-1}$

if $x_n > x_{n-1} < x_{n-2}$ and $x_{n-1} < Max - threshold$ and $x_{n-1} > -MAX$,

And if $x_{n-1} < Min$ or $x_{n-1} < dc_{n-1}$, then $Min = x_{n-1}$

where, x_n, x_{n-1}, x_{n-2} are respectively a sample at time n, a sample at time n-1 and a sample at time n-2 of said first input signal, dc_{n-1} is a low frequency component of the envelope of the demodulated signal at time n-1, Max and Min represent values of negative and positive peaks of the envelope of the demodulated signal, and threshold and MAX are preset constants.

17. Apparatus as claimed in claim 16, wherein said filter is arranged to calculate a component of the offset signal of the

form : $$dc_n = (1-\alpha_n)dc_{n-1} + \frac{\alpha_n}{2}(Max + Min)$$

where, dc_n is said frequency component of said input signal at time n, dc_{n-1} is said frequency component at time n-1, and α_n is a coefficient of the filter at time n.

18. A detector as claimed in claim 1 wherein the demodulated baseboard signal and the sampled signal comprise two signal components in phase quadrature.

19. A differential detector comprising:

a frequency converter arranged to convert an input signal into a demodulated baseband signal;

sampling means arranged to sample said demodulated baseband signal at a sampling frequency to provide a sampled signal;

a demodulator arranged to demodulate the sampled signal to provide a demodulated signal; and

a filter arranged to filter the demodulated signal to provide a filtered signal indicative of a frequency offset of the input signal and wherein the filter is arranged to have a bandwidth which decreases as a function of time.